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RESONATOR FOR A MAGNETRON

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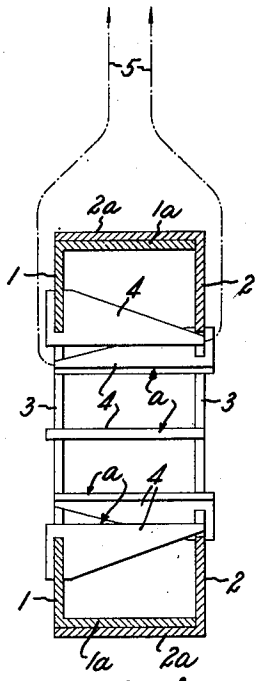

Fig. 1.

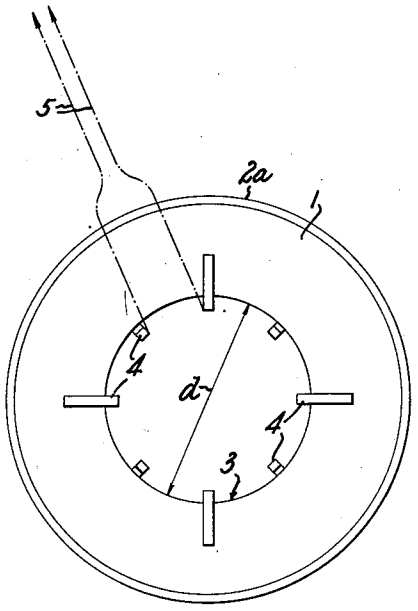

Fig. 2.

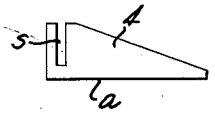

Fig. 3.

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RESONATOR FOR A MAGNETRON

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5 Claims. (Cl. 315—39.73)

The present invention relates to the mechanical construction of the resonator for a magnetron such as disclosed in Patent No. 2,579,593, Fritz Lüdi. This magnetron includes a resonator which consists of an annular hollow body which is at least nearly closed and is limited in radial direction by two cylindrical surfaces, the inner cylindrical surface being formed by a plurality of anode segments which are alternately connected with one and the other annular side walls of the resonator and extend perpendicular to the axis of the resonator.

Objects of the present invention are to provide a magnetron resonator which is mechanically very sturdy and which may be manufactured in quantities with very small tolerances. A further object is to provide a magnetron resonator having a simple and efficient system of terminal connections for abstracting the generated electromagnetic waves from the generator.

These and other objects and the advantages of the invention will be apparent from the following specification when taken with the accompanying drawing, in which:

Fig. 1 is a substantially central section through a magnetron resonator embodying the invention;

Fig. 2 is an end elevation of the same; and

Fig. 3 is an elevation of one of the anode segments.

In the drawing, the reference numerals 1 and 2 identify the annular end walls of two oppositely arranged and cup-shaped shells whose cylindrical walls 1*a*, 2*a*, respectively, are telescoped and soldered to constitute the outer cylindrical wall of the resonator. The circular openings 3 of the end walls of the two shells are axially alined and of the same diameter *d*.

Each anode segment 4 is of sheet metal of approximately trapezoidal form with an inner edge a parallel to the resonator axis, and with the several inner edges defining a cylindrical surface of somewhat smaller diameter than the diameter *d* of the circular openings in the end walls 1 and 2 of the cup-shaped shells. This projection of the anode plates into the axial opening of the resonator facilitates the accurate positioning of the anode segments during manufacture by means of a simple cylindrical gauge which fits within the axial opening and has uniformly spaced axial grooves for the reception of the edges of the anode plates.

Each anode plate 4 has a deep slot *s* adjacent its broader end, and perpendicular to the active edge *a*, for fitting snugly over an annular end wall of one of the shells of the resonator. After proper assembly of the anode segments within the telescoped shells by means of the gauge, not shown, the segments are individually soldered to their supporting walls and the gauge is removed axially from the resonator. It will be noted that the anode plates are of such length and taper that the smaller free end of each plate is spaced radially from the adjacent end wall but projects axially beyond the same.

The projection of the anode plates enables a very simple arrangement for the withdrawal of the generated energy. As indicated by dotted lines 5, a symmetrical high-frequency or Lecher line is connected to the tips of two opposite phase anode segments for this purpose. The high-frequency line 5 is arranged without major curvature and completely outside the resonator; and therefore breaks in its side walls or in its outer cylindrical surface are unnecessary.

Molybdenum is preferably employed as the material for the construction of the resonator as it is heat resistant and may be soldered with the use of technical platinum. A coating of zirconium may be applied over the finished resonator to improve the heat radiation during operation of the magnetron and also to serve as a getter during the evacuation of an envelope within which the resonator and an appropriate cathode are installed.

While we have illustrated an embodiment of the invention which has eight anode segments, it is to be understood that the invention is not limited to this or any other particular even number of anode segments.

We claim:

1. A magnetron resonator comprising two oppositely arranged and cup-shaped shells having their cylindrical walls telescoped and secured to each other to constitute the outer cylindrical wall of the resonator, the end walls of the shells constituting the side walls of the resonator and having axially aligned circular openings of the same diameter therethrough, and an even number of flat metal plates constituting anodes uniformly spaced circumferentially in radial planes through the axis of the assembled shells, said plates being secured in alternation to the respective shells and each with its free end spaced from the shell to which it is not secured, each of said plates having a slot therein extending perpendicularly to the inner edge thereof and being arranged with the slot thereof fitted over the end wall of the shell to which it is secured, the inner edge of each plate extending parallel to the axis of the assembled shells and closer to the axis of the assembled shells than the inner edges of the circular openings in the end walls of said shells.

2. A magnetron resonator as recited in claim 1, wherein each anode metal plate is of approximately trapezoidal form.

3. A magnetron resonator as recited in claim 1, wherein said shells and anode metal plates are of molybdenum, and said plates are soldered to said shells with platinum.

4. A magnetron resonator as recited in claim 3, in combination with a coating of zirconium upon the same.

5. A magnetron resonator as recited in claim 1, wherein said cylindrical walls of said shells are imperforate, and the free ends of said anode metal plates project axially beyond the end wall of the shell to which they are not secured, whereby a symmetrical output line may be located outside of said resonator and connected to the projecting ends of two anode metal plates of opposite phase.

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